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Rural Water Supplies in South Dakota : Hanson County

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HANSON
County

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RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

HANSON COUNTY

BY

WALTER V. SEARIGHT

AND

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PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

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Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of flowing wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

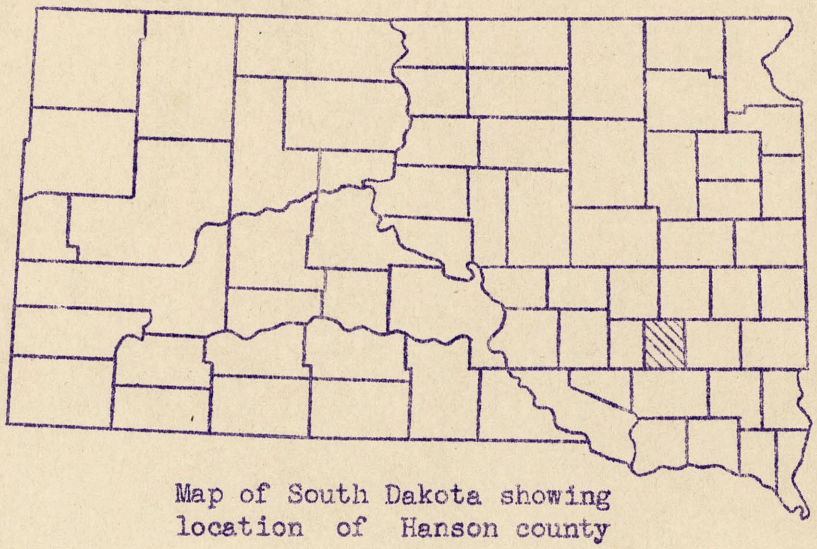
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

Hanson County

Hanson county lies near the center of southeastern South Dakota. It is bounded on the north by Sanborn and Miner counties, on the east by McCook county, on the south by Hutchinson county, and on the west by Davison county.



Map of South Dakota showing location of Hanson county

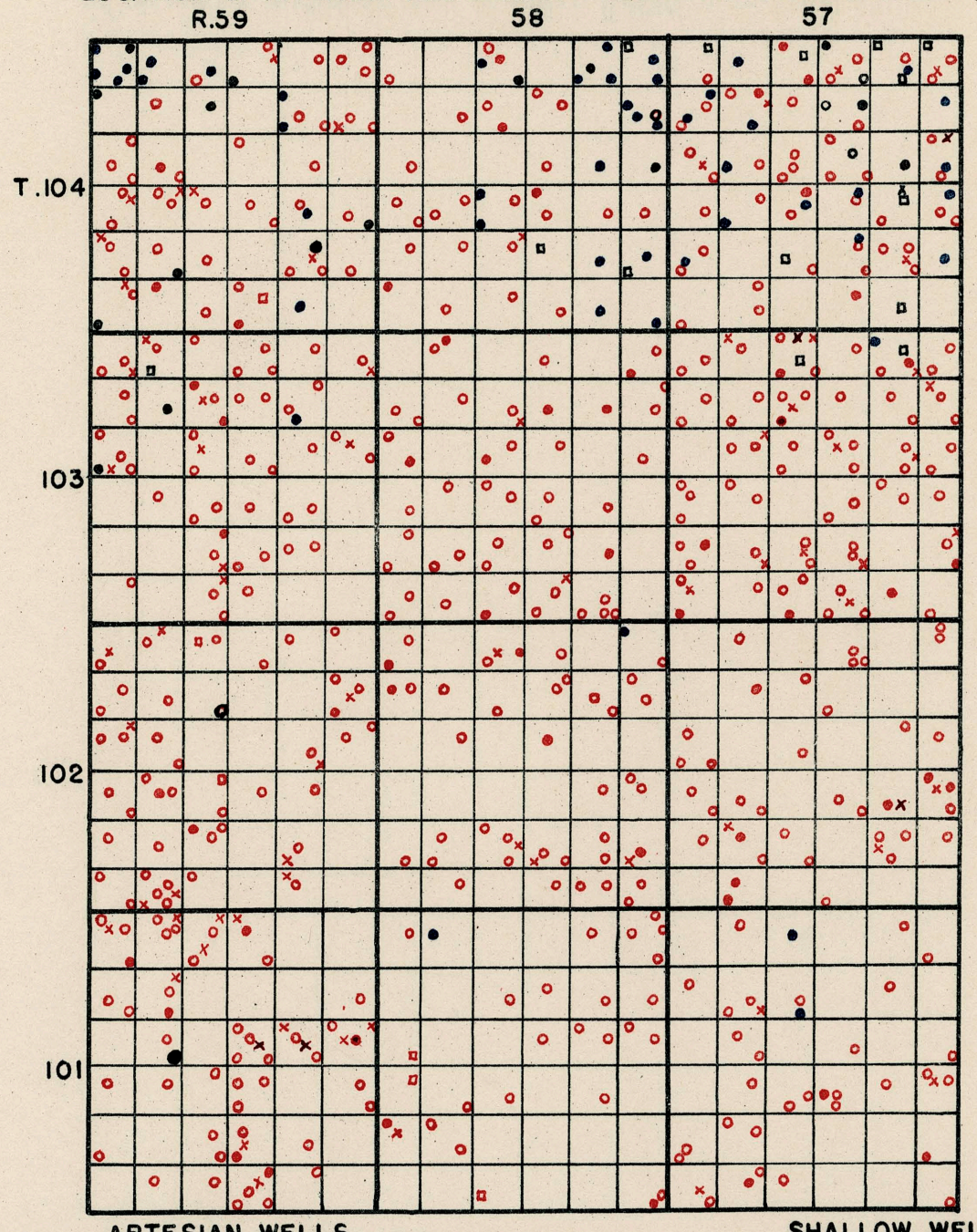
Most of the area is devoted to farming, with 221,635 acres or 95 per cent of the county divided into 1572 farms of approximately 140 acres in each farm unit. Corn, wheat, barley, oats, hay and rye are the important field crops, the first three being most important. Livestock is important, cattle, sheep, and hogs being raised in the order named. Dairy products are also important.*

In an area where a large part is farm land, where livestock, especially dairy cattle and hogs are raised, generally distributed sources of water supply are necessary. A constant and adequate supply, not necessarily large, at a relatively low cost, is required to operate farms of these sizes and organization profitably. The well location map of Hanson county shows that wells are abundant and widely distributed in the county.

On the well location map of Hanson county all flowing wells and those believed to obtain water from artesian sources are indicated as artesian wells in black. All others reported by questionnaires, regardless of depth, are

*South Dakota Agricultural Statistics, Annual Report, 1937

LOCATION OF ARTESIAN AND SHALLOW WELLS IN HANSON COUNTY



ARTESIAN WELLS

- FLOWING WELLS—STEADY OR INCREASING
- FLOWING WELLS—DECREASED FLOW
- CEASED FLOWING
- PUMPED

SHALLOW WELLS

- ADEQUATE SUPPLY
- INADEQUATE SUPPLY
- DRY WELLS
- SPRINGS

WELLS FROM OTHER SOURCES

shown in red as shallow wells. On all other maps, in tables, and in the text of this report, wells 200 feet or less are shallow wells and those more than 200 feet deep are deep wells unless otherwise noted.

Of the questionnaires sent out in Hanson county, 58 per cent returned data on a total of 514 wells.

DEPTH AND DISTRIBUTION

Water in Hanson county is obtained from shallow wells, 200 feet or less in depth, deep pumped wells, and flowing artesian wells. Most of the wells are shallow since a total of 422 or 82 per cent of all wells reported were shallow wells. Indeed, in the three townships which form the southern tier in the county all wells reported were shallow wells. Seven other townships report more than three fourths of the total wells to be shallow wells. These have been tabulated together with the percentage of shallow wells as follows:

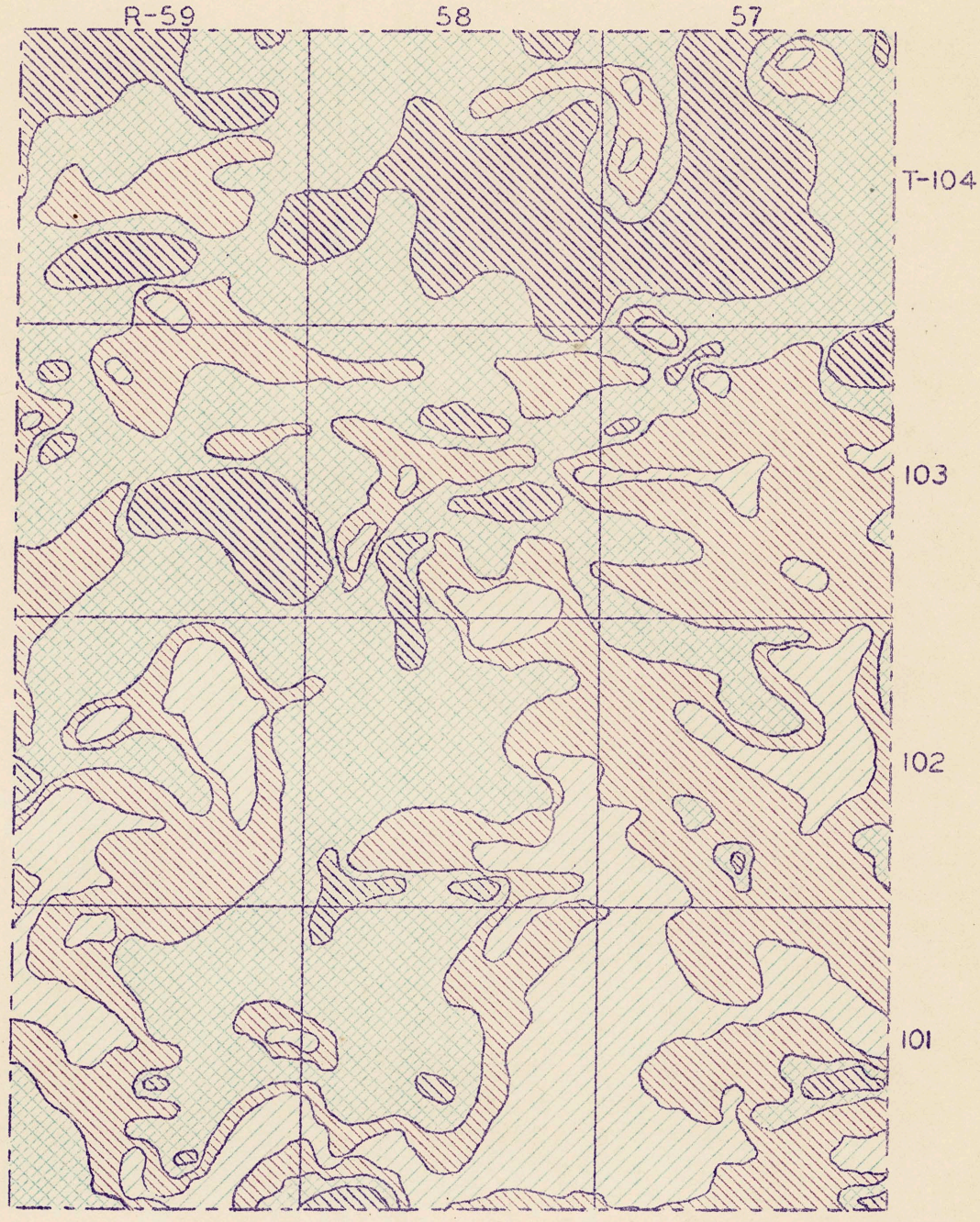
Twp.	Rge.	Per cent Shallow	Twp.	Rge.	Per cent Shallow
101N	59W	91	103N	57W	91.
102	58	89.4	103	58	95.6
102	59	85.7	104	59	82.9
104	58	75.8			

Nearly one fourth, 22.6 per cent, of the shallow wells are 50 feet or less in depth. The remainder, however, 77.4 per cent, are distributed by depth as follows: 50 to 100 feet, 27.7 per cent, 100 to 150 feet, 26.7 per cent and 150 to 200 feet, 22.8 per cent. Thus, approximately half of the shallow wells reported are 100 feet or less in depth and about half are deeper.

The areal distribution of shallow wells has been mapped on 50 foot depth intervals (shallow well map) to show the probable distribution of shallow waters available.

Among the wells reported from Hanson county, 80 or 15.6 per cent of all wells were deep pumped wells, more than 200 feet deep. Twelve of the flowing wells were also deep wells. Of all wells, deep wells, therefore, are 17.8 per cent of those reported. These wells occur in nine townships and are locally

HANSON COUNTY



SHALLOW WELLS (0-200 FT)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

- 0-50 FT
- 50-100 FT
- 100-150 FT
- 150-200 FT

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more or less important. They range from 4.3 per cent of the total up to 59.3 per cent of the total wells in these townships. The townships, number, percentage of total wells which are deep, and the minimum and maximum depths are given in the following table:

Twp.	Rge.	Number of Wells	Per cent of Total Wells	Depths Min.	Max.
101N	59W	4	8.6	-	350
102	58	4	10.5	-	220
102	59	6	14.2	-	287
103	57	6	8.9	-	490
103	58	2	4.3	-	257
103	59	19	40.4	-	500
104	57	35	59.3	287	560
104	58	8	24.2	120	480
104	59	8	17.	100	252

The flowing wells are roughly half shallow wells and half deep wells which range in depth from 54 to 575 feet in depth. Some of the shallower of these obtain water from sands of the glacial period but most of them terminate in Cretaceous sandstones. The flows reported vary from one to eleven gallons per minute. One well was reported to be equipped with a control valve.

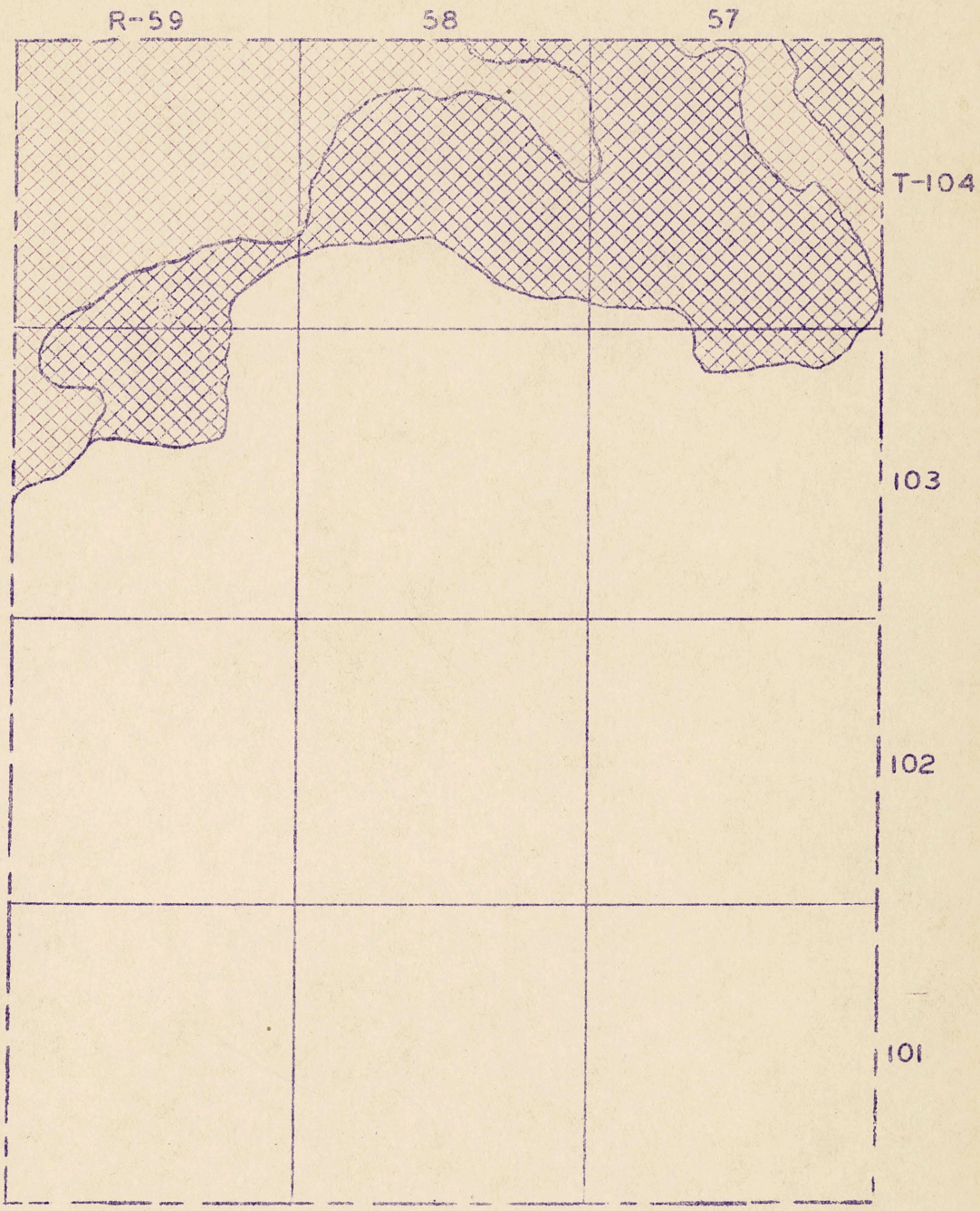
The distribution of flowing wells is indicated on the well location map and the artesian map. The relation between this area to that of the state is indicated on the artesian map of South Dakota.

CHARACTER OF WELL WATERS

The character of the rural well waters of Hanson county has been determined from replies by farmers to questionnaires. Each farmer was asked whether he considered the water from his well to be hard, moderately hard, or soft and whether the water was satisfactory for drinking. Although detailed analyses, the most satisfactory basis for determination of quality are rarely available, usage is probably a fairly good criterion of general quality. Detailed determination of quality and character must await laboratory analyses.

Most of the well waters of Hanson county are hard. Of the 412 shallow wells reported, 61.8 per cent were hard, 34.8 per cent moderately hard, and

ARTESIAN AREAS 1938



HANSON COUNTY

FLOWING WELLS

PUMPED WELLS

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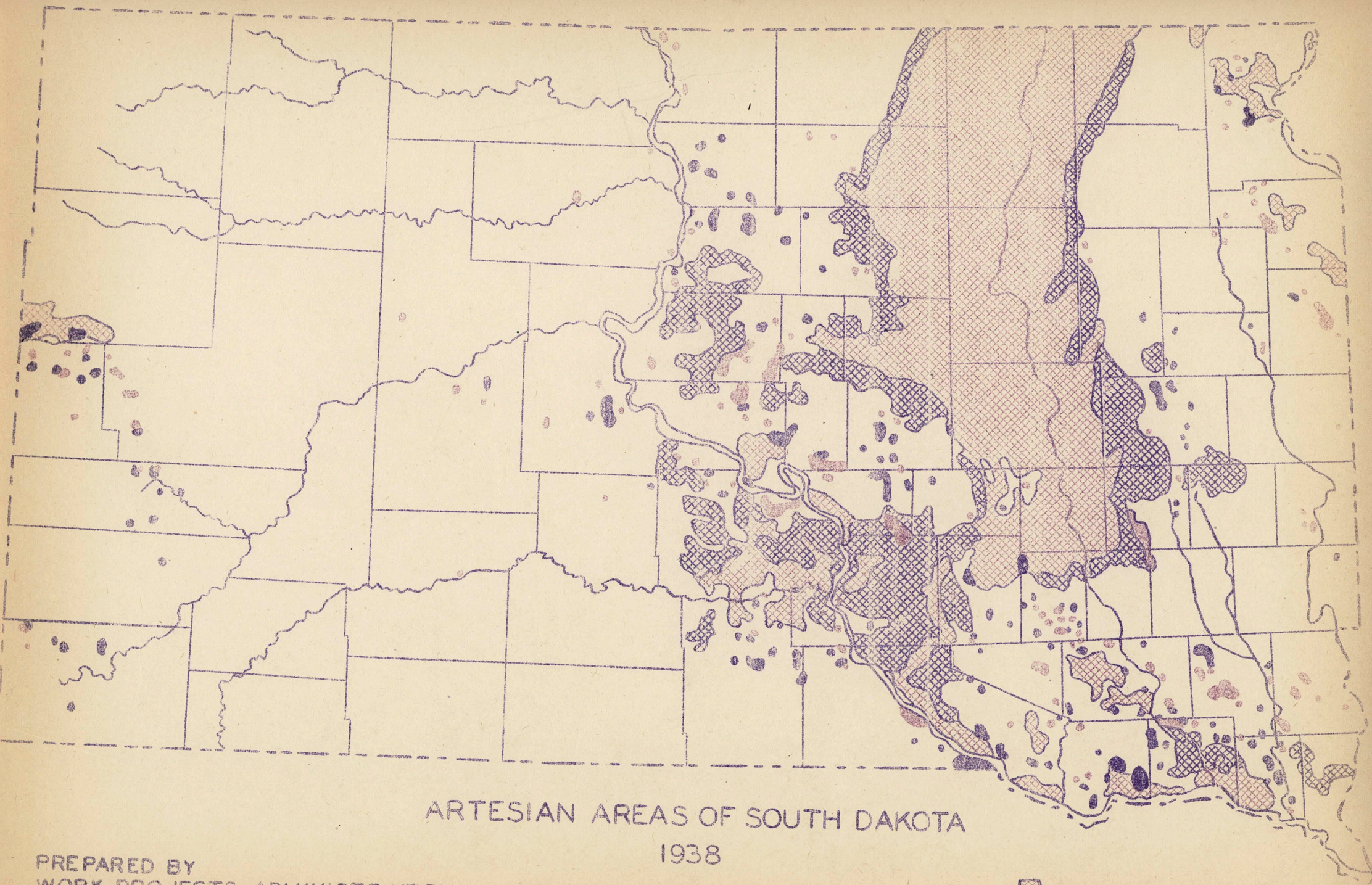

ARTESIAN AREAS OF SOUTH DAKOTA
1938

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W.P. 3636

only 3.3 per cent definitely soft. Thus, 96.6 per cent of the shallow wells were reported to be moderately to definitely hard. Likewise, the deep pumped wells were reported to be 63 per cent hard, 33 per cent moderately hard and only four per cent soft. Again, 96 per cent of these wells were reported moderately to definitely hard. The users of flowing wells report 70 per cent to be hard water wells and the remainder moderately hard.

Although well waters are mostly hard, most of the waters are satisfactory for drinking. Farmers report 14.3 per cent of the shallow wells unsatisfactory for drinking and only 2.5 per cent of the deep pumped wells were reported unsatisfactory.

ADEQUACY OF SUPPLY

Water supplied by the wells of Hanson county is, for the most part, adequate for current use according to reports by farmers. Users of shallow well waters report 13.8 per cent inadequate, whereas those who use deep pumped wells report only 2.5 per cent inadequate, a very small proportion. Flowing wells are reported to be 13.6 per cent inadequate, possibly owing to lack of repairs to the well, decreasing flow, or casing of too small a size.

IRRIGATION

Wells in eastern South Dakota are used in many places to irrigate small plots such as farm gardens. In Hanson county 14 shallow pumped wells were used to irrigate 1 1/2 acres varying in size from 1/8 to 3/4 acres. One deep pumped well and one flowing well were also used to irrigate small plots.

SUPPLEMENTARY WATER SUPPLIES

In eastern South Dakota springs and cisterns are important supplementary water supplies. In Hanson county, however, springs are relatively unimportant and only six are reported. Two were used for stock and domestic uses, one was

unsatisfactory for drinking and one was used to irrigate 1/4 acre. In any area in which much of the water obtained from wells is hard, cisterns are an important source of supplementary supplies. A total of 367 were reported from Hanson county, roughly four cisterns to five wells. They are extensively used for laundry purposes and to some extent to supplement inadequate supplies from wells.

HANSON COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
101	57	30	9	190	69	14	15	-	4	6	27	3	-	-
101	58	23	20	187	73	15	7	1	1	5	21	2	1	3/4
101	59	41	20	200	86	31	2	4	12	9	35	6	1	1/8
102	57	36	25	160	67	10	21	-	3	2	29	7	3	1/8
102	58	34	32	180	93	23	11	-	5	9	28	6	-	-
102	59	35	16	175	79	24	9	-	5	6	32	3	1	-
103	57	61	10	190	92	38	17	3	15	13	53	8	2	1/8
103	58	44	10	200	108	30	10	-	11	2	36	8	1	-
103	59	28	18	200	129	16	10	-	3	1	26	2	2	1/8
104	57	24	12	200	153	9	10	3	2	3	19	5	1	1/8
104	58	23	90	195	150	7	13	2	4	2	19	4	1	-
104	59	33	20	196	128	21	9	-	6	1	30	3	1	1/8
Total		412				238	134	13	71	59	355	57	14	1 1/2

HANSON COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approximate Acres Irrigated
101	59	4	220	350	268	3	-	-	-	-	4	-	-	-
102	58	4	208	220	214	-	4	-	-	-	4	-	-	-
102	59	6	211	287	233	3	3	-	1	-	6	-	-	-
103	57	6	210	490	308	4	2	-	1	-	5	1	-	-
103	58	2	230	257	243	2	-	-	1	-	2	-	-	-
103	59	17	207	500	292	12	-	-	8	1	16	1	-	-
104	57	29	230	560	364	13	13	3	7	-	29	-	1	1/2
104	58	6	219	480	307	4	2	-	2	1	6	-	-	-
104	59	6	210	252	239	5	-	-	-	-	6	-	-	-
Total		80				46	24	3	20	2	78	2	1	1/2

NOTE: No wells reported for the following townships and ranges in this group: T.101 R.57, 58; T.102 R.57.

HANSON COUNTY
Table 3.
DATA ON FLOWING WELLS

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approx. Acres Irrigated	Ave. Gallon Per Min.	Number Controlled
101	59	1	-	-	-	1	-	-	-	-	1	-	-	-	3.50	-
102	59	1	-	-	54	1	-	-	1	-	1	-	-	-	-	-
103	59	2	-	-	430	2	-	-	-	-	2	-	1	1/2	7.00	-
104	57	6	287	500	400	1	4	-	-	-	6	-	-	-	1.87	-
104	58	4	120	575	339	3	1	-	1	-	2	2	-	-	11.00	-
104	59	8	100	310	199	6	1	-	3	-	7	1	-	-	3.25	-
Total		22				14	6		5		19	3	1	1/2	26.6	-

NOTE: No wells reported for the following townships and ranges in this group: T.101 R.57, 58; T.102 R.57, 58; T.103 R.57, 58.

Hanson County Well Notes

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.101N., R.57W. SW 1/4 Sec. 22	146 feet: "Water bearing material is granite. (46 ft. in granite)
T.101N., R.59W. SE 1/4 Sec. 12	220 feet: "Water bearing material is granite. (90 ft. in granite). The well driller said it would supply a city with water."
T.101N., R.59W. SW 1/4 Sec. 15	60 feet: "Water tastes alright when pumped fresh. If water is left standing 20 minutes it has a tendancy to become sort of thick. There is quite lot of sediment in it."
T.101N., R.59W. NE 1/4 Sec. 24	108 feet: "Water bearing material is granite. The water gets very cloudy after standing in the pail for a time."
T.102N., R.57W. SE 1/4 Sec. 20	150 feet: "Water bearing material is granite."
T.103N., R.57W. NE 1/4 Sec.25	100 feet: "Well is in several kinds of rock or coal,granite soapstone Some people say it is coal and pipestone. When first pumped water is oily. Top of water in tank will be covered with oil."
T.103N., R.59W. SW 1/4 Sec. 16	306 feet: "Water not good for domestic use. Water hard and rusty, eats water pails in few days."
T.103N., R.59W. NE 1/4 Sec. 33	332 feet: "Two other drilled wells on this farm gradually filled in with very fine sand, which was drilled out several times. The water supply became less every year and well could be pumped dry in few hours. The present well was drilled thru 320 ft. of dirt and 12 ft. of rock. Supplys plenty of water."
T.104N., R.59W. NE 1/4 Sec. 34	No depth given: "They say the reason we can't have a well here is the shale and shells spoil the water and ruin the cylinder."

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